
FY 00 SITE Program Cost Savings and Vendor Benefits

Promotion of Innovative Technologies

SITE is recognized by EPA as one of its principal programs to advance innovative site monitoring, characterization, and cleanup technologies with the potential to treat hazardous wastes more efficiently, less expensively, and more safely than existing methods. SITE's mission is to promote the development and application of innovative technologies that reduce or eliminate risks to human health and the environment due to contamination. The goal of the program is to interact with the technology user community, understand its needs, integrate those needs with EPA's research mission, and expeditiously address those needs. Identifying and responding to the technology needs of the remediation community is the driving force behind today's SITE Program.

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The need for credible and reliable data for innovative technologies remains significant. Often the RODs indicated that innovative technologies were not chosen due to a lack of verified performance and implementability. For example, of the 80 RODs signed in 1994 that selected established technologies, 16 (or 20 percent) considered but rejected an innovative technology for remediation of the site. The SITE Program serves to fill this need for credible evaluations so that more effective,

cost-efficient methods can be used on remediation problems.

The types and numbers of innovative technologies selected for remediation at Superfund sites increased significantly after the passage of the Superfund Amendments and Reauthorization Act (SARA). While rarely used during the early 1980s, innovative technologies comprised approximately one-quarter of the total number of technologies selected for Superfund remediation projects in FY 86 and FY 87. Since then, the number has continued to rise, indicating increased credibility and confidence in a number of innovative treatment technologies. As a result, more innovative technologies than conventional technologies were selected in Records of Decisions (RODs—official records documenting selection of Superfund site cleanup methods) signed during FY 93 through FY 99. Although SITE is only one contributing factor in increasing innovative technology selection, the program has played a significant role in this activity.

During the first 10 years of the SITE Program, an emphasis was placed on innovative technologies for permanent treatment that usually required the removal of soil or groundwater. Most field demonstrations during this period in the program's history involved ex situ physical/chemical and thermal technologies that could be field tested in a matter of days or weeks. The need for innovative, in situ technologies that are more cost-effective, result in less secondary waste, and are less intrusive will continue to increase. The SITE Program has recognized this need and has emphasized the development of in situ technologies.

Figure 2 presents the number of in situ technologies as a percentage of all treatment technologies for source control by fiscal year. Over time, use of in situ technologies has been increasing, as the trendline in Figure 2 shows. A five-year moving average of the percentage of in situ treatment technologies shows a generally steady increase from 28 percent (FY1985-1988) to 51 percent (FY1995-1999). Several factors may play a role in this upward trend in the use of in situ treatment technologies. Because in situ technologies require no excavation, risk from exposure to contaminated media is reduced, compared with levels of risk associated with technologies that do require excavation. Further, for large sites where excavation and materials handling for ex situ technologies can be expensive, in situ technologies are often more cost-effective.

Historical Program Cost Savings and Vendor Contracting

Since its establishment in 1986, the SITE Program has assisted in the development and use of innovative technologies, resulting in substantial cost savings for cleaning up contaminated sites. The cost savings realized by federal facilities has been estimated by analysis of RODs from 1993 - 1999; this analysis is described below. The SITE Program has also assisted vendors in advancing innovative technologies from the development phase to full-scale application, and has promoted greater acceptance of these technologies. The following subsections provide examples of the financial success of the SITE Program in terms of federal cost savings, and vendor successes.

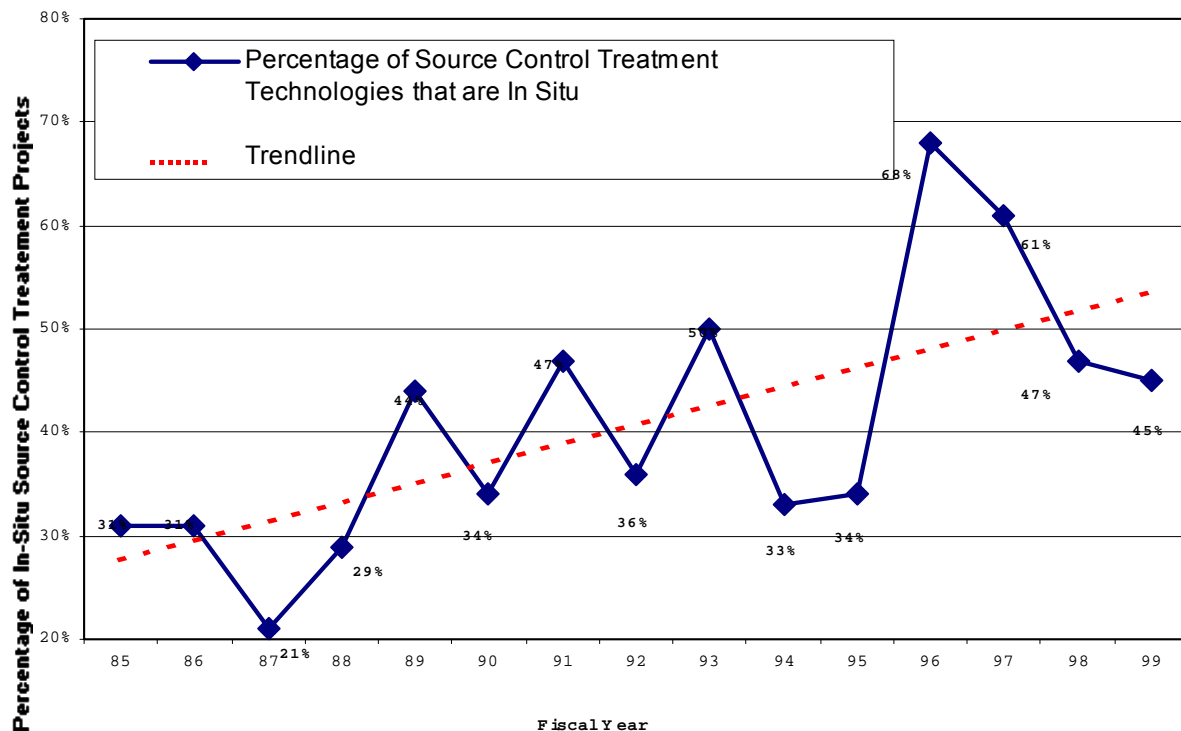


Figure 2. Superfund Remedial Actions: In Situ Technologies for Source Control (FY 1985- FY 1999)

Source: U.S. EPA Office of Solid Waste and Emergency Response, Innovative Treatment Technologies Annual Status Report, Tenth Edition (S42-R-01-004)

SITE Program Accomplishments - Federal Cost Savings from RODs Analysis

Since 1993, the use of innovative technologies has outpaced that of established technologies, resulting in dramatic cost savings. During 1996, 1999, 2000, and 2001, the SITE Program collected information from signed RODs (dated 1993-1999) in all 10 EPA Regions that selected an innovative technology as the remedy. These technologies include soil vapor extraction, thermal desorption, bioremediation, phytoremediation, surfactant flooding, and many other technologies that have passed through the Program. The data compiled by the SITE Program allowed environmental managers to compare innovative technologies to conventional technologies (i.e., pump and treat technologies, incineration, and excavation and land filling), especially with respect to cost. Documentation was obtained from updated data on a total of 195 RODs that selected innovative technologies for part or all of the remediation. As the innovative technologies discussed in this report become more accepted and used as the baseline for remediation, they will be viewed as conventional technologies for comparison to newer technologies. The SITE Program will periodically evaluate whether technologies that are no longer considered innovative should be added to the baseline of conventional technologies. The Program will conduct this review in FY 2002 and thereafter on a 5-year basis.

EPA guidance recommends that ROD estimates assess remedial alternatives with an accuracy of +50 percent to -30 percent. Of the 195 RODs that selected innovative technologies, 98 had sufficient information to make a cost comparison between the selected technology and a conventional technology. Cost savings realized by using innovative technologies for the 98 RODs was estimated at \$2.6 billion in 2000 dollars, with an average percent savings per site of 72

percent. Only 13 of the 98 RODs reported that the innovative technology was more expensive than or equal to the established technology.

To estimate SITE Program net benefits, the FY 93-99 RODs and the SITE Program budget were inflated to the end of 2000 using Consumer Price Index (CPI) inflation figures. The total inflated cost savings for RODs dated 1993-1999 was \$2.6 billion, and the total inflated SITE Program budget from 1986-2000 was \$ 181 million. This comparison represents an estimated inflated cost savings of over \$ 2.4 billion for various site cleanups.

Figure 3 shows a breakdown of savings by technology type. Soil vapor extraction (SVE) showed the highest savings of over \$1.25 billion, followed by \$517 million for bioremediation. SVE was one of the initial technologies accepted into the SITE Program (in the late 1980s), and large savings would therefore be expected from this technology. Solvent extraction, thermal desorption, and vitrification each accounted for over \$100 million in savings. Phytoremediation and permeable reactive barriers are newer technologies that are beginning to be chosen in RODs, with five and four sites having specified their use, respectively, with an associated cost savings of \$76 million as compared to conventional technologies. The number of sites and associated costs savings for phytoremediation and treatment barrier sites are expected to increase rapidly in coming years.

Historical Vendor Benefits

Technology vendors are a central part of the SITE Program, providing remediation services for sites requiring clean-up solutions. Vendors experience various benefits by participating in the SITE Program, namely increased exposure, market share, technical acceptance, and recognition. Increased acceptance of innovative technologies is demonstrated by the level of commercial activity experienced by SITE Program vendors. For example, 1999 information indicated that since completing SITE

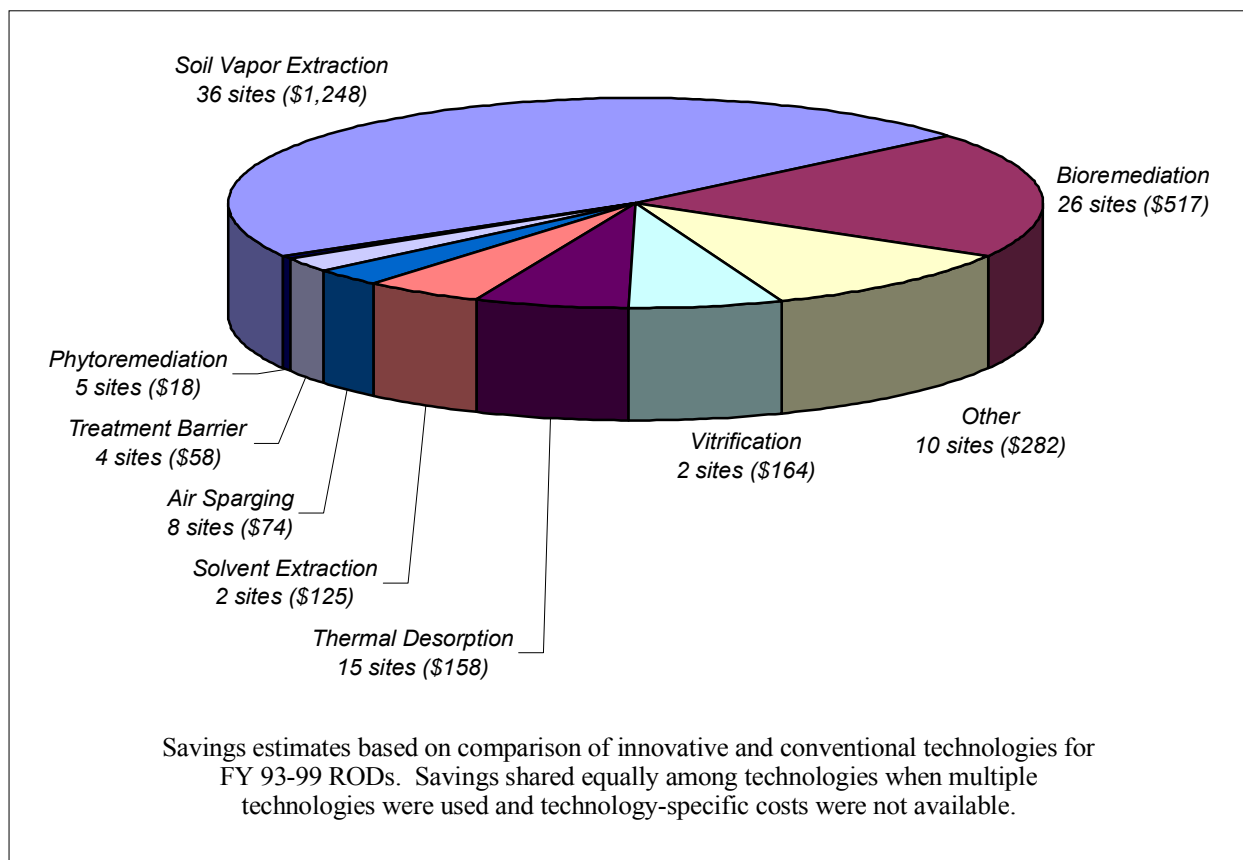


Figure 3. Cost savings estimated from RODs analysis by technology type (millions of 2000 dollars).

demonstration projects, vendors received 1,921 remediation contracts, and 1,308 treatability studies (Figure 4).

As part of a SITE Program evaluation in 1999, 43 Demonstration Program vendors provided information regarding company revenues after completion of their demonstration. Following participation in the SITE Program, 58 percent of the responding vendors were awarded commercial remediation jobs using technologies demonstrated in the SITE Program. Thirty-three percent of the vendors were awarded more than 10 contracts each. Over 35 percent reported one or more international contracts, identifying 37 countries where jobs were contracted. Figure 5 provides a historical perspective of growth in the number of contracts awarded to SITE vendors from 1990 to 1999.

The 1999 Demonstration Program vendor information has been broken down by technology type to ascertain which technologies demonstrated the greatest commercial success. Figure 6 shows the share by technology type of the 3,229 remediation and treatability contracts awarded to vendors. It is clear from this chart that soil vapor extraction and bioremediation technologies have had the most commercial success.

This trend from the vendor information is consistent with the RODs analysis results which were shown in Figure 2, providing two sources of

“Our involvement with the SITE Program and especially our EPA Project Officer, Ed Bates, has been very successful. We appreciate everyone’s efforts and the program’s agenda.”

data to confirm the outstanding commercial success of these technologies.

SITE Program participants who responded indicated that they experienced up to an 800% increase in sales as a result of their involvement in the SITE Program.

In addition to the 43 Demonstration Program vendors, information was obtained in 1999 from 14 vendors that participated in the MMT Program. This information clearly demonstrated the benefits that vendors receive from the program, indicating that 71 percent of the vendors sold more than 25 units since their demonstration in the SITE Program. Over 64 percent of the vendors

indicated that their technologies were used on international remediation projects. In total, the MMT vendors reported selling over 3,550 units on over 900 jobs, including 48 international jobs.

Overall, vendor information shows that SITE technology developers in the Demonstration and MMT Programs are achieving commercial success for demonstrated technologies. The impact of the SITE Program continues to grow over time, as illustrated by the consistent growth in vendor contracts over the last decade (Figure 5).

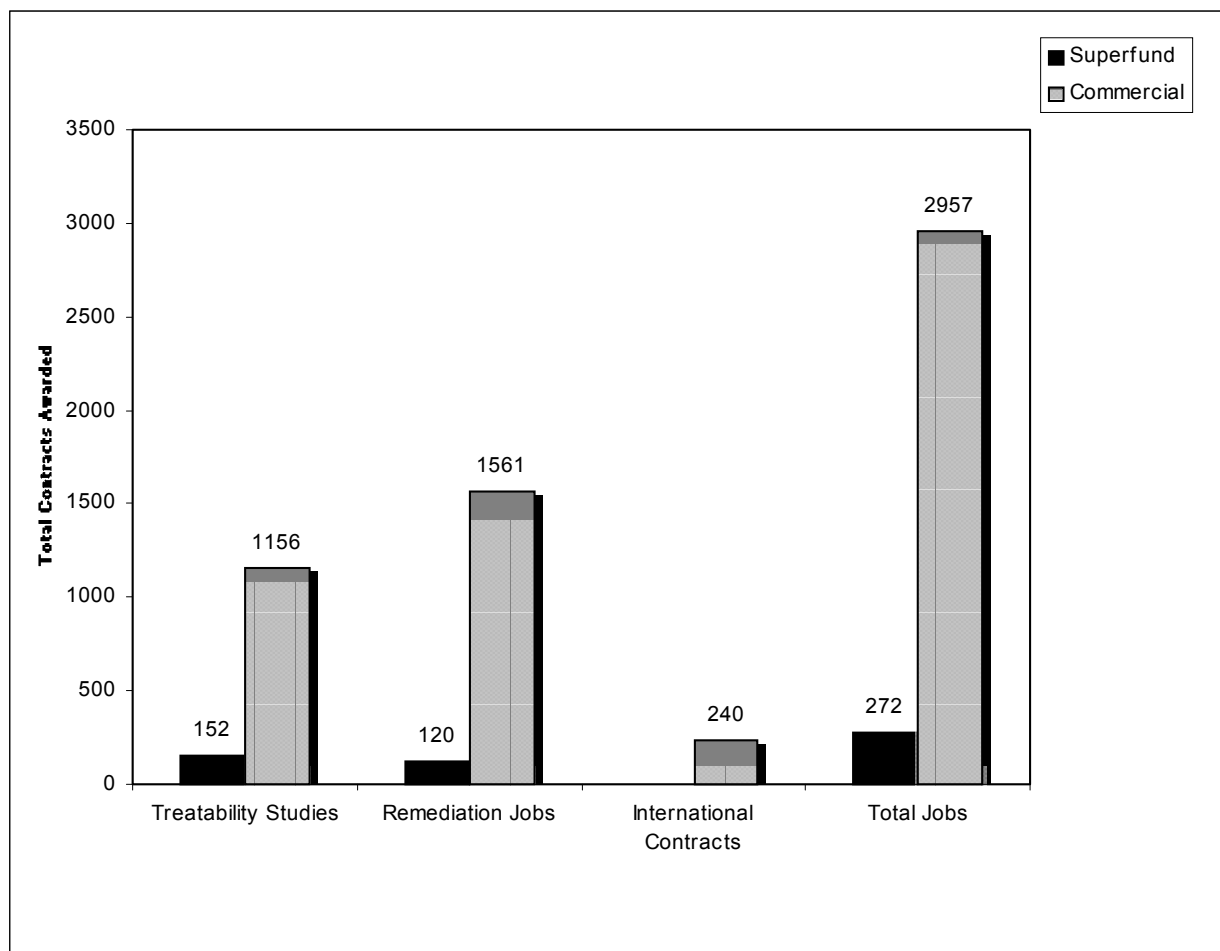


Figure 4. Categorization of contracts awarded to SITE vendors following program participation. (Source: 1999 vendor information)

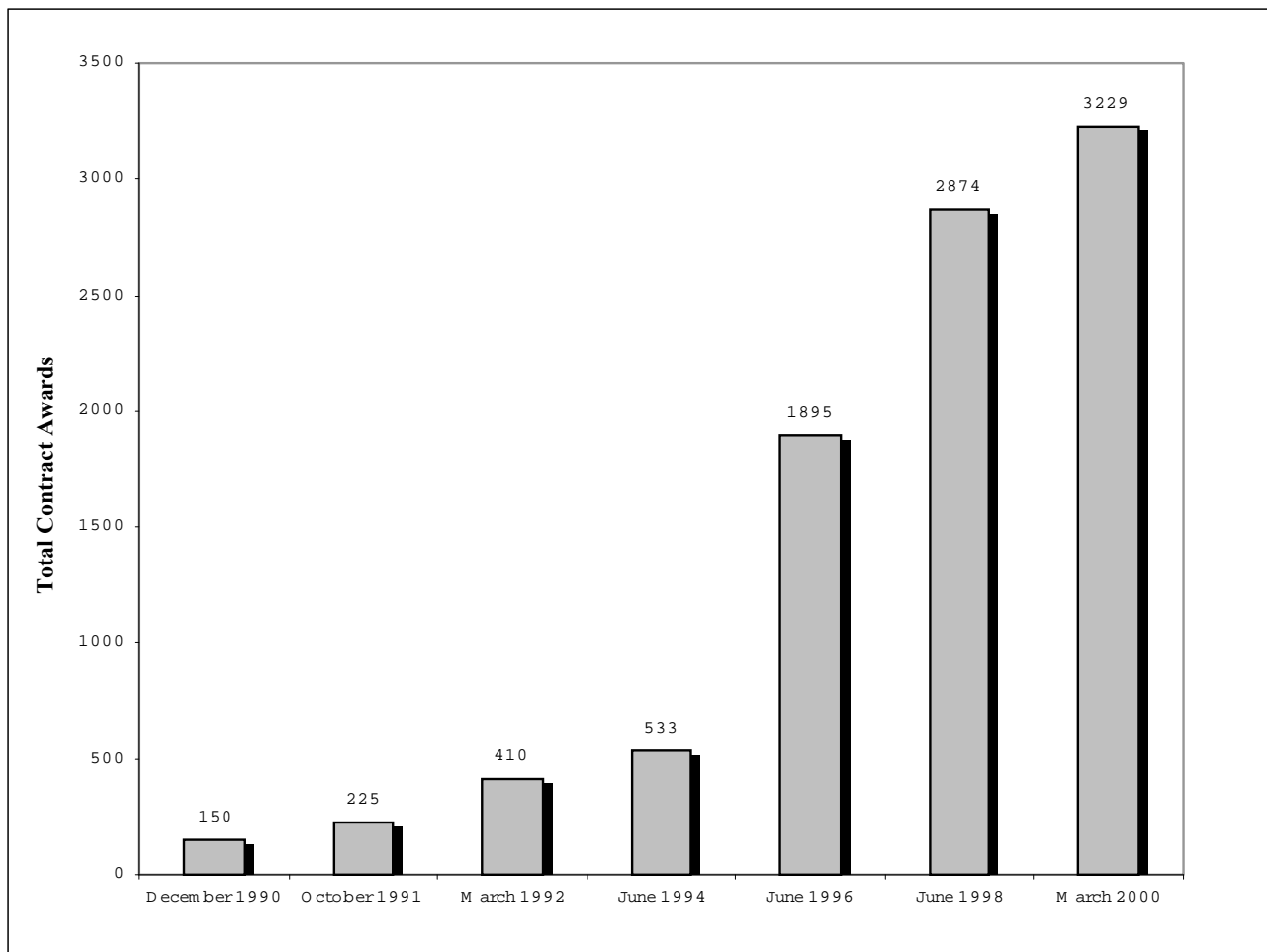


Figure 5. Total number of contracts awarded to SITE vendors after program participation
(Source: 1990-2000 vendor information)

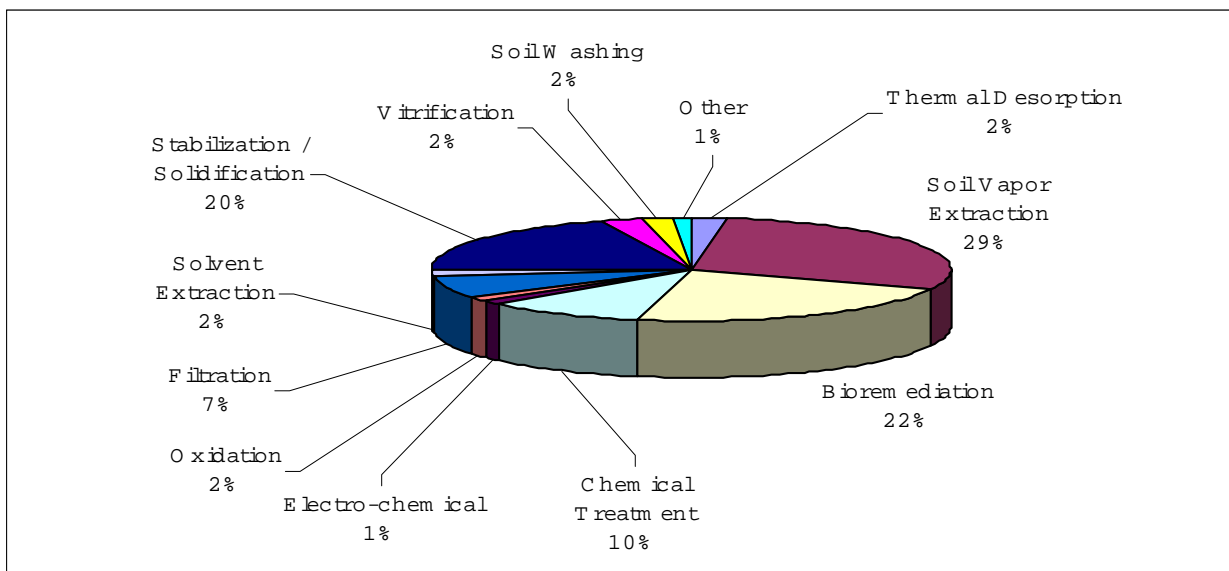


Figure 6. Share of 3,220 total contracts awarded to SITE Demonstration vendors by technology type (Source: 2000 vendor information)